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(54) Title: IMPROVED ENVIRONMENTALLY FRIENDLY GUM BASES AND CHEWING GUMS INCLUDING SAME

(57) Abstract: Gum bases, chewing gums, and methods of manufacturing same are provided. The gum bases do not include filler. It has been found that by using a gum base that does not include filler, a chewing gum is produced that results in gum cuds that have reduced adhesion.

SPECIFICATIONTITLE**"IMPROVED ENVIRONMENTALLY FRIENDLY GUM BASES AND
CHEWING GUMS INCLUDING SAME"**

5

BACKGROUND OF THE INVENTION

The present invention relates generally to chewing gum compositions and methods for making same. More specifically, the present invention relates to chewing gum compositions that produce gum cuds having reduced adhesion as compared to
10 typical chewing gum compositions.

Chewing gum-like substances have been enjoyed for hundreds of years. In the nineteenth century, the predecessor to today's chewing gum compositions were developed. Today, chewing gum is enjoyed daily by millions of people world wide.

When chewing gum is chewed, a water insoluble gum cud remains. Typically,
15 gum cuds are mainly composed of a water insoluble portion that is represented by the gum base. The gum cud is usually disposed of in the wrapper that initially houses the chewing gum. Of course, the gum cud can be disposed of in other substrates by wrapping the substrate around the gum cud. There are a variety of other ways and methods for disposing gum cuds.

20 Although gum cuds can be easily disposed of without creating any problems, gum cuds, when improperly disposed of, can create environmental issues. In this regard, the improper disposal of chewing gum, e.g. expectorating the chewing gum on a sidewalk, floor, or like area, can create a nuisance. Due to their typical formulation, gum cuds have an adhesive-like characteristic. Therefore, the chewed gum cuds can stick to
25 environmental surfaces onto which they are intentionally or unintentionally placed. This can create issues if the gum cuds are improperly discarded. Such environmental surfaces can include concrete, flooring materials, walls, fabric, carpeting, metal, wood, plastic, glass, and other surfaces.

There have been a number of attempts to provide biodegradable chewing gum
30 and/or environmentally friendly chewing gum. Published PCT Application No. PCT/US98/20656 discloses plasticized poly(D,L-lactide)polymers that are used to create biodegradable chewing gum bases. Published PCT Application No. PCT/US97/11008

discloses lactic acid-based co-polymers for use as a masticatory substance. U.S. Patent No. 5,672,367 sets forth biodegradable chewing gums based on poly(lactic acid-co-caprolactone) elastomers. Other patents relating to environmentally friendly chewing gum and gum bases, modified gum bases, or methods of removing adhered cuds include:

5 WO 92-008836, Use of Ricinoleate Derived Compound to Remove Chewing Gum Adhering to Surfaces; WO 96-028041, Environmentally Friendly Chewing Gum Compositions Containing Elastic Protein Based Polymers; WO 98-058550, Environmentally Friendly Gum; EP 0,421,670, Non-Tack Chewing Gum Base; US 3,984,574, Non-Tack Chewing Gum Composition; US 5,580,590, Protein Based

10 Elastomers Useful in Compounding Biodegradable Bases; JP 96-131082A, Low Tack Gum Base and Chewing Gum; JP 88-007747A, Chewing Food Base Composed of Proteins and Tannin; EP 0,079,082, New Gum Base, A Method For Preparing and Chewing Gum Containing Same; EP 0,711,506, Biodegradable Gum With Base Having Biodegradable Polymers; US 4,518,615, Non-Adhesive Gum Base; US 5,424,081,

15 Chewing Gum; and WO 96-020609, Non-Stick Chewing Gum.

SUMMARY OF THE INVENTION

The present invention provides a gum base, and resulting chewing gum, that is environmentally friendly. As used herein, the term "environmentally friendly" refers to

20 chewing gum compositions that can be easily removed from indoor or outdoor surfaces.

It has been surprisingly found that by reducing and/or eliminating inert filler from gum base, it is possible to produce a chewing gum wherein the resultant gum cud has improved removability from surfaces.

To this end, the present invention provides a gum base comprising an elastomer,

25 a softener, an emulsifier, and does not include any filler.

In an embodiment, the elastomer comprises: approximately 3% to about 50% by weight of the gum base; the softener comprises approximately 3% to about 50% by weight of the gum base; and the emulsifier comprises approximately 2% to about 20% by weight of the gum base.

30 In an embodiment, the gum base includes an elastomer solvent.

In an embodiment, the gum base includes a resin; in a further embodiment, the

resin chosen from the group consisting of polyvinylacetate, vinylacetate-vinyllaurate copolymer, ethylenevinylacetate, and polyvinyl alcohol.

In an embodiment, the resin comprises approximately 5% to about 75% by weight of the gum base.

5 In another embodiment of the present invention, gum base is provided comprising an elastomer, a softener, an emulsifier, an elastomer solvent, a resin, and no filler.

In an embodiment, the elastomer comprises approximately 3% to about 50% by weight of the gum base, the softener comprises approximately 3% to about 50% by weight of the gum base, the emulsifier comprises approximately 2% to about 20% by weight of the gum base, the resin comprises approximately 5% to about 75% by weight of the gum base, and the elastomer solvent comprises approximately 3% to about 70% by weight of the gum base.

In yet another embodiment of the present invention, chewing gum is provided comprising a water soluble portion including a flavor and a water insoluble gum base portion that does not include a filler.

15 In an embodiment, the chewing gum is sugar free.

In an embodiment of the chewing gum, the elastomer comprises approximately 3% to about 50% by weight of the water insoluble gum base portion, the softener comprises approximately 3% to about 50% by weight of the water insoluble gum base portion, the emulsifier comprises approximately 2% to about 20% by weight of the water insoluble gum base portion, the resin comprises approximately 5% to about 75% by weight of the water insoluble gum base portion, and the elastomer solvent comprises approximately 3% to about 70% by weight of the water insoluble gum base portion.

In another embodiment of the present invention, a method for producing chewing gum that has reduced adhesion if a resultant chewed gum cud is improperly discarded is provided. The method comprises the steps of providing a gum base that does not include a filler.

It is an advantage of the present invention to provide a more environmentally friendly chewing gum base.

30 It is a further advantage of the present invention to provide a chewing gum that is environmentally friendly.

Moreover, an advantage of the present invention is to provide a chewing gum composition that will produce a resultant gum cud that, if improperly discarded onto a surface, can be easily removed therefrom.

Furthermore, an advantage of the present invention is to provide a method for
5 manufacturing chewing gum that produces chewing gum that when chewed produces gum cuds that have reduced adhesion.

Additional features and advantages of the present invention are described in and will be apparent from the detailed description of the presently preferred embodiments.

10
DETAILED DESCRIPTION OF THE
PRESENTLY PREFERRED EMBODIMENTS

In part, the present invention provides improved gum bases. Moreover, the present invention provides improved chewing gum made from the gum bases. To this end, the present invention provides gum bases that produce more environmentally
15 friendly gum cuds. In this regard, the gum bases produce chewing gum that when chewed results in gum cuds that have reduced adhesion.

It has been surprisingly found that chewing gums that do not include filler in the gum base produce gum cuds that if improperly discarded have reduced adhesion to environmental surfaces such as wood, concrete, fabric, carpet, metal and other such
20 surfaces. Typically, gum bases include fillers. These fillers are inert organic powders such as calcium carbonate, magnesium carbonate, ground limestone, and silica type compounds such as magnesium and aluminum silicate, clay, alumina, talc, titanium dioxide, calcium phosphate and combinations thereof. It has been found that by eliminating these fillers from gum bases, that the resultant chewing gum, when chewed,
25 will produce gum cuds having reduced adhesion to environmental surfaces. It is believed that eliminating the fillers from the gum base prevents the fillers from mixing with the active elements of the gum base (e.g. polymers, fats, softeners, and flavors) causing a decrease in gum cud removal times.

It has been found that these fillers can be removed from typical gum base
30 formulations and replaced with other ingredients such as plasticizers or elastomers. By adjusting the levels of plasticizers and elastomers, this will compensate for any change

in texture, taste, and overall quality of the product.

A variety of different chewing gums can be created pursuant to the present invention. Such chewing gums can include sugar gums, sugarless gums, bubble gums, coated gums, and novelty gums. Such chewing gums can be formed in the shape of pellets, sticks, tabs, or chunks. A variety of different chewing gum formulations are possible.

Chewing gum generally comprises a water soluble portion and a water insoluble portion. The water insoluble portion is referred to as the gum base.

Pursuant to the present invention the water-insoluble portion of the gum typically may contain any combination of elastomers, vinyl polymers, elastomer plasticizers, softeners, waxes and other optional ingredients such as colorants and antioxidants. The variety of gum base ingredients typically used provide the ability to modify the chewing characteristics of gums made from the gum base.

Elastomers provide the rubbery, cohesive nature to the gum which varies depending on this ingredient's chemical structure and how it is compounded with other ingredients. Elastomers suitable for use in the gum base and gum of the present invention include butadiene-styrene copolymers (SBR), isobutylene-isoprene copolymers (Butyl rubber), polybutadiene, polyisobutylene, and vinyl polymeric elastomers (polyvinyl acetate, polyethylene, vinyl acetate/vinyl laurate, vinyl acetate/vinyl stearate, ethylene/vinyl acetate) or mixtures thereof.

Other optional ingredients such as antioxidants may also be used in the gum base.

Antioxidants prolong shelf-life and storage of gum base, finished gum or their respective components including fats and flavor oils. Antioxidants suitable for use in gum base or gum of the present invention include butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), beta-carotenes, tocopherols, acidulants such as Vitamin C, propyl gallate, and other synthetic and natural types or mixtures thereof.

Preferably, the antioxidants used in the gum base are butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), tocopherols, or mixtures thereof.

Waxes may be used in the gum base. Waxes aid in the solidification of gum bases and improving the shelf-life and texture. Wax crystal also improves the release of flavor. The smaller crystal size allows slower release of flavor since there is more

hindrance of the flavor's escape from this wax versus a wax having larger crystal sizes.

Synthetic waxes are produced by means atypical of petroleum wax production and thus are not considered petroleum wax. These synthetic waxes may be used in accordance with the present invention and may be included optionally in the gum base
5 and gum.

The synthetic waxes may include waxes containing branched alkanes and copolymerized with monomers such as but not limited to polypropylene and polyethylene and Fischer-Tropsch type waxes. Polyethylene wax is not in the same category as polyethylene, a polymer of ethylene monomers. Rather, polyethylene wax is a synthetic
10 wax containing alkane units of varying lengths having attached thereto ethylene monomers.

Wax-free gum bases are specifically contemplated by the present invention. In these embodiments, wax is omitted and may be compensated for by using increased levels of fats and oils as is known in the prior art.

15 Elastomer plasticizers vary the firmness of the gum base. The plasticizers are glycerol ester of partially hydrogenated rosin, glycerol ester of polymerized rosin, glycerol ester of partially dimerized rosin, glycerol ester of rosin, glycerol ester of tall oil rosin, pentaerythritol esters of partially hydrogenated rosin, partially hydrogenated methyl esters of rosin, pentaerythritol ester of rosin, synthetic elastomer plasticizers such
20 as terpene resins derived from alpha-pinene, beta-pinene and/or d-limonene and mixtures thereof.

The elastomer plasticizers used may be of one type or of combinations of more than one. Typically, the ratios of one to the other are dependent on each respective softening point, on each effect on flavor release, and on each respective degree of tack
25 they cause to the gum.

Fats modify the texture of the gum base by introducing sharp melting transition during chewing. Fats suitable for use in the gum base and gum of the present invention include triglycerides of non- hydrogenated, partially hydrogenated and fully hydrogenated cottonseed oil, soybean oil, palm oil, palm kernel oil, coconut oil, safflower
30 oil, tallow oil, cocoa butter, medium chained triglycerides and the like.

The preferred fats include unsaturated, partially saturated or fully saturated oils

that contain, as one or more of their constituent groups, fatty acids of carbon chain length of from 6 to 18. Monoglycerides, diglycerides, acetylated monoglycerides, distilled mono- and diglycerides and lecithin may, from their manufacturing processing, contain triglyceride levels less than 2 percent by weight. Mono- and diglycerides maybe
5 considered as being of the same family as fats (triglycerides), or would be in a family of their own, namely emulsifiers.

Flavorants and colorants impart characteristics or remove or mask undesired characteristics. Colorants may typically include FD&C type lakes, plant extracts, fruit and vegetable extracts and titanium dioxide. Flavorants may typically include cocoa
10 powder, heat-modified amino acids and other vegetable extracts.

Gum bases are typically prepared by adding an amount of the elastomer and plasticizer to a heated (50-240°F) sigma blade mixer with a front to rear speed ratio of from about 1.2:1 to about 2:1, the higher ratio typically being used for chewing gum base which requires more rigorous compounding of its elastomers.

15 Compounding typically begins to be effective once the ingredients have massed together. Anywhere from 15 minutes to 90 minutes may be the length of compounding time. Preferably, the time of compounding is from 20 minutes to about 60 minutes. The amount of added plasticizer depends on the level of elastomer present. If too much elastomer plasticizer is added, the initial mass becomes over plasticized and not
20 homogeneous.

Continuous processes using mixing extruders may also be used to prepare the gum base. After the initial ingredients have massed homogeneously and been compounded for the time desired, the balances of the base ingredients are added in a sequential manner until a completely homogeneous molten mass is attained. Typically,
25 any remainder of elastomer and plasticizer are added within approximately 60 minutes after the initial compounding time. The optional waxes and the oils are typically added after the elastomer and plasticizers and during the next 60 minutes. Then the mass is allowed to become homogeneous before discharging.

Typical base batch processing times may vary from about one to about three
30 hours, preferably from about 1 ½ to 2 ½ hours, depending on the formulation. The final mass temperature when discharged may be between 50°C and 130°C and preferably

between 70°C and 120°C. The completed molten mass is emptied from the mixing kettle into coated or lined pans, extruded or cast into any desirable shape and allowed to cool and solidify. Those skilled in the art will recognize that many variations of the above described procedure may be followed.

- 5 In the alternative continuous process, ingredients are added continuously at various points along the length of the extruder. In this case, the transmit time through the extruder would be substantially less than an hour.

 The water-soluble portion of the chewing gum may comprise softeners, sweeteners, flavoring agents and combinations thereof. The sweeteners often fill the role
10 of bulking agents in the gum. The bulking agents generally comprise from approximately 5 percent to about 90 percent, preferably from approximately 20 percent to about 80 percent.

 Softeners are added to the chewing gum in order to optimize the chewability and mouth feel of the gum. Softeners typically constitute from approximately 0.5 percent to
15 about 25.0 percent by weight of the chewing gum. Softeners contemplated for use in the gum include glycerin, lecithin and combinations thereof. Further, aqueous sweetener solutions such as those containing sorbitol, hydrogenated starch hydrolysates, corn syrup and combinations thereof may be used as softeners and bulking agents in gum. Sugar-free formulations are also typical.

- 20 Sugar sweeteners generally include saccharide-containing components commonly known in the chewing gum art which comprise, but are not limited to, sucrose, dextrose, maltose, dextrin, dried invert sugar, fructose, levulose, galactose, corn syrup solids and the like, alone or in any combination.

 The present invention can also be used in combination with sugarless sweeteners.
25 Generally, sugarless sweeteners include components with sweetening characteristics but which are devoid of the commonly known sugars and comprise, but are not limited to, sugar alcohols such as sorbitol, mannitol, xylitol, hydrogenated starch hydrolyzates, maltitol and the like, alone or in any combination.

 Depending on the particular sweetness release profile and shelf-life stability
30 needed, the present invention can also be used in combination with coated or uncoated high-intensity sweeteners or with high-intensity sweeteners coated with other materials

and by other techniques.

High-intensity sweeteners, or artificial sweeteners and peptide sweeteners as they may be referred to, typically may include, but are not limited to, alitame, thaumatin, aspartame, sucralose, acesulfame, saccharin and dihydrochalcones. The range of these
5 sweetener types in gum typically may range from approximately 0.02 to about 0.10 weight percent for sweeteners such as alitame, thaumatin and dihydrochalcones, and from approximately 0.1 to about 0.3 weight percent for sweeteners like aspartame, sucralose, acesulfame and saccharin.

A flavoring agent may be present in the chewing gum in an amount within the
10 range of from approximately 0.1 to about 10.0 weight percent and preferably from approximately 0.5 to about 3.0 weight percent of the gum. The flavoring agents may comprise essential oils, synthetic flavors, or mixtures thereof including, but not limited to, oils derived from plants and fruits such as citrus oils, fruit essences, peppermint oil, spearmint oil, clove oil, oil of wintergreen, anise and the like. Artificial flavoring
15 components are also contemplated for use in gums of the present invention. Those skilled in the art will recognize that natural and artificial flavoring agents may be combined in any sensory acceptable blend. All such flavors and flavor blends are contemplated for use in gums of the present invention.

Optional ingredients such as colors, emulsifiers and pharmaceutical agents may
20 be added to the chewing gum.

In general, chewing gum is manufactured by sequentially adding the various chewing gum ingredients to a commercially available mixer known in the art. After the initial ingredients have been thoroughly mixed, the gum mass is discharged from the mixer and shaped into the desired form such as by rolling into sheets and cutting into
25 sticks, extruded into chunks or casting into pellets.

Generally, the ingredients are mixed by first melting the gum base and adding it to the running mixer. The base may also be melted in the mixer itself. Color or emulsifiers may also be added at this time. A softener such as glycerin may also be added at this time, along with syrup and a portion of the bulking agent/sweetener.
30 Further portions of the bulking agent/sweetener may then be added to the mixer. A flavoring agent is typically added with the final portion of the bulking agent/sweetener.

A high-intensity sweetener is preferably added after the final portion of bulking agent and flavor have been added.

The entire mixing procedure typically takes from five to fifteen minutes, but longer mixing times may sometimes be required. Those skilled in the art will recognize that many variations of the above described procedure may be followed. Again, one specifically contemplated embodiment is the use of an extruding mixer for continuous processing. In such a process, ingredients are added continuously at various points along the length of the extruder while homogeneously mixed gum continuously issues from the discharge end of the extruder.

By way of example, and not limitation, examples of the present invention are set forth below.

Example No. 1

A conventional gum base having the following formulation was prepared:

15	Polyisobutylene	6.6%
	Butyl Rubber	10.1%
	Polyvinylacetate	27.3%
	Terpene Resin	26.8%
	Lecithin	3.7%
20	Glycerol Monostearate	4.8%
	Hydrogenated Vegetable Oil	9.3%
	Calcium Carbonate (filler)	10.8%
	BHA	0.1%
	Color	0.5%
25		100.0%

Example No. 2

An embodiment of the present invention was prepared using the same base ingredients as set forth in Example 1, however the filler (calcium carbonate) was removed. To this end, the following formula was prepared:

	Polyisobutylene	7.6%
	Butyl Rubber	11.1%
35	Polyvinylacetate	28.0%
	Terpene Resin	27.8%
	Lecithin	4.7%
	Glycerol Monostearate	6.9%

Hydrogenated Vegetable Oil	13.3%
BHA	0.1%
Color	0.5%

5 100.0%

Examples Nos. 3-7

Chewing gums were prepared according to the following formulas:

10		<u>Example No.3</u>	<u>Example No.4</u>	<u>Example No. 5</u>
		(Comparative)	(Inventive)	(Inventive)
	Gum Base of Example 1	27.00%	----	----
	Gum Base of Example 2	----	17.00%	20.00%
15	Sugar	48.00%	60.00%	57.10%
	Corn Syrup	7.00%	6.80%	6.80%
	Dextrose Monohydrate	15.00%	14.00%	14.00%
	Glycerin	0.90%	0.10%	0.10%
	Encapsulated Aspartame	0.50%	----	----
20	Encapsulated Acesulfame K	0.20%	0.50%	0.40%
	Lecithin	----	0.50%	0.20%
	Salt Solution (10.0%)	0.10%	0.10%	0.50%
	Flavor	1.30%	1.00%	0.90%
25		100.00%	100.00%	100.00%

		<u>Example No.6</u>	<u>Example No.7</u>
		(Inventive)	(Inventive)
30	Gum Base of Example 2	20.00%	20.00%
	Sugar	55.20%	55.20%
	Corn Syrup	7.00%	7.00%
	Dextrose Monohydrate	14.00%	14.00%
	Polyethylene Wax	0.50%	1.00%
35	Glycerin	1.00%	1.00%
	Encapsulated Acesulfame K	0.50%	0.50%
	Lecithin	0.30%	0.30%
	Salt Solution	0.50%	0.50%
	Flavor	1.00%	0.50%
40		100.00%	100.00%

RESULTS

The chewing gums from Example Nos. 3-7 were tested for adhesion to concrete
 45 according to the following method.

Gum pieces were soaked in water overnight to remove water-soluble components. The resultant gum cuds were then applied to concrete blocks using 200 pounds of pressure for thirty seconds. Two additional concrete blocks were placed on top of the block, which retained the compressed gum cud for 3 days.

5 After 3 days, the two top blocks were removed, and the bottom concrete block with the compressed gum cud sat out at room temperature for another 3 days. Next, a high-pressure spray washer, using a water temperature of 185°F and 3000 psi pressure was used to remove the cud. The time to remove and the percent reduction were noted and are set forth below in Table No. 1.

10 Results (average n=3) for the gum cuds were as follows:

TABLE NO. 1

	Time(s)	Reduction %
15 Ex. No.3 (Comparative)	4.70	0.00%
Ex. No.4 (Inventive)	2.47	47.00%
Ex. No.5 (Inventive)	2.53	46.00%
Ex. No.6 (Inventive)	3.12	34.00%
20 Ex. No.7 (Inventive)	3.74	20.00%

The above table illustrates that the inventive gum exhibited much less adhesion than the comparative gum.

25 It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present invention and without diminishing its attendant advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

30

WE CLAIM:

1. A gum base comprising:
an elastomer;
a softener;
5 an emulsifier; and
not including any filler.
2. The gum base of Claim 1 wherein:
the elastomer comprises approximately 3% to about 50% by weight of the gum
10 base;
the softener comprises approximately 3% to about 50% by weight of the gum
base; and
the emulsifier comprises approximately 2% to about 20% by weight of the gum
base.
15
3. The gum base of Claim 1 including an elastomer solvent.
4. The gum base of Claim 1 including a resin.
- 20 5. The gum base of Claim 4 wherein the resin is chosen from the group
consisting of polyvinylacetate, vinylacetate-vinyllaurate copolymer, ethylenevinylacetate
and polyvinyl alcohol.
6. The gum base of Claim 4 wherein the resin comprises approximately 5%
25 to about 75% by weight of the gum base.
7. The gum base of Claim 1 including:
a color; and
30 an antioxidant.

8. A gum base comprising:
an elastomer;
a softener;
an emulsifier;
5 an elastomer solvent;
a resin; and
no filler.
9. The gum base of Claim 8 wherein:
10 the elastomer comprises approximately 3% to about 50% by weight of the gum
base;
the softener comprises approximately 3% to about 50% by weight of the gum
base;
the emulsifier comprises approximately 2% to about 20% by weight of the gum
15 base;
the resin comprises approximately 5% to about 75% by weight of the gum base;
and
the elastomer solvent comprises approximately 3% to about 70% by weight of the
gum base.
20
10. A chewing gum comprising:
a water soluble portion including a flavor; and
a water insoluble gum base portion that does not include a filler.
- 25 11. The chewing gum of Claim 10 wherein the chewing gum is sugar free.
12. The chewing gum of Claim 10 wherein the water insoluble gum base
portion includes:
an elastomer;
30 a softener;
a resin;

an emulsifier; and
an elastomer solvent.

13. The chewing gum of Claim 12 wherein:

5 the elastomer comprises approximately 3% to about 50% by weight of the water insoluble gum base portion;

the softener comprises approximately 3% to about 50% by weight of the water insoluble gum base portion;

10 the emulsifier comprises approximately 2% to about 20% by weight of the water insoluble gum base portion;

the resin comprises approximately 5% to about 75% by weight of the water insoluble gum base portion; and

the elastomer solvent comprises approximately 3% to about 70% by weight of the water insoluble gum base portion.

15

14. A method for producing chewing gum wherein a resultant gum cud that is produced has reduced adhesion to environmental surfaces as compared to a gum cud produced by typical chewing gum formulations comprising the steps of using a gum base to produce the chewing gum that does not include a filler.

20

15. The method of Claim 14 wherein the gum base includes an elastomer, a softener, an emulsifier, an elastomer solvent, and no filler.

16. The method of Claim 14, wherein the gum base includes:

25 an elastomer that comprises approximately 3% to about 50% by weight of the gum base;

a softener that comprises approximately 3% to about 50% by weight of the gum base;

30 an emulsifier that comprises approximately 2% to about 20% by weight of the gum base;

a resin that comprises approximately 5% to about 75% by weight of the gum

base; and

an elastomer solvent that comprises approximately 3% to about 70% by weight of the gum base.